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EXAMINER
LEUNG, JENNIFER A

ART UNIT PAPER NUMBER
1764

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/821,858

Applicant(s)

ECKARDT ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 11-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-13 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7,9,10.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-10, drawn to a device comprising a heating chamber, a feed line, a blower, and a control unit, classified in class 422, subclass 198.
 - II. Claims 11-13, drawn to a method for the recombination of hydrogen and oxygen in a gas mixture, classified in class 423, subclass 580.1.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another and materially different process, such as waste gas purification of exhaust from an internal combustion engine or semiconductor process.

2. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and the search required for Group I not required for Group II, restriction for examination purposes as indicated is proper.
3. During a telephone conversation with Mr. Gregory L. Mayback on November 22, 2002 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-10. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-13 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings and Specification

5. The drawings and specification have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 7 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The language of the claims is directed to a method limitation which renders the claims vague and indefinite, as it is unclear as to what structural elements the applicants are attempting to recite since "the gas mixture" and "the parameter characteristic" are not considered elements of the apparatus.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 3, 4, 5, 8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Taylor et al. (U.S. 3,706,535).

With respect to claims 1 and 10, Taylor et al. (FIG. 1-2; generally, column 3, line 11 to column 5, line 42) disclose a device comprising:

- A heating chamber (i.e. the right chamber of burner unit **11**, comprising heat exchanger **34**; column 4, lines 2-11);
- A feed line (i.e. comprising pipes **62**, **65**, **68**, **72** and entrance pipe **21**) for feeding a gas mixture, which may comprise a hydrogen content (i.e. hydrogen, hydrogen vapor; column 2, lines 19-25), into said heating chamber;
- A blower **64** connected in said feed line **62**, **65**, **68**, **72**, **21** and having a delivery rate (column 6, lines 49-59); and
- A control unit **43** associated with said blower **64** for adjusting the delivery rate of said blower **64** in dependence on a parameter characteristic of the gas stream (i.e. the measured temperature of the gas stream, via sensors **45**, **46**, **47**, **52**, **53**; column 6, line 57-column 7, line 14).

With respect to claim 3, Taylor et al. further disclose a number of heating elements for heating said heating chamber (i.e. heating elements or pipes **35** of heat exchanger **34**; column 6, lines 15-48; FIG. 1).

With respect to claim 4, Taylor et al. disclose each of said heating elements **35** disposed within a respective flow pipe (i.e. a flow pipe defined by inner metallic wall **14**, with the gas

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stream flowing over the outer surface of pipes **35** of heat exchanger **34**; FIG. 2).

With respect to claim 5, Taylor et al. disclose said heating chamber (i.e. the right chamber of burner unit **11**) has a downstream side, and a reaction chamber (i.e. the left chamber of burner unit **11**, comprising catalyst bed **31**; FIG. 1; column 6, lines 22-48) is connected at said downstream side of said heating chamber.

With respect to claim 8, Taylor et al. further disclose an internally insulated housing in which said heating chamber is disposed (i.e. housing **12** which has outer and inner metallic walls **13** and **14** with suitable heat insulation **15**, such as asbestos, a ceramic, or the like, disposed therebetween; column 3, lines 11-18; FIG. 1).

Instant claims 1, 3, 4, 5, 8 and 10 structurally read on the apparatus of Taylor et al.

8. Claims 1, 2, 5 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishino (JP 64-020498).

With respect to claims 1 and 10, Nishino (Abstract; FIG. 1) discloses a device comprising:

- A heater **13**;
- A feed line for feeding a gas mixture having a hydrogen content into said heater **13**;
- A blower **7** connected in said feed line and having a delivery rate; and
- A control unit (i.e. comprising computing elements **9**, **10**) associated with said blower **7** for adjusting the delivery rate of said blower **7** (i.e. indirectly via flow rate controller **3**) in dependence on the parameter characteristic for the hydrogen content of the gas mixture, wherein the parameter characteristic is a measured temperature value of the gas mixture flowing out of said heater **13** (i.e. via signals from temperature sensors **11**, **12**).

Although heater **13** schematically illustrated as a "coil" in FIG. 1, the Examiner takes Official

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Notice that a heater "chamber" is well known in the art.

With respect to claim 2, Nishino further discloses a hydrogen sensor for determining the hydrogen content of the gas mixture, said control unit having an input side connected to said hydrogen sensor (i.e. "Computing elements 9, 10 automatically regulate the opening degree of the inlet flow rate... using the average value m% of the measured concn. value m1% of the hydrogen in the dry well obtd. by the atmosphere monitor... "; Abstract).

With respect to claim 5, Nishino further discloses a reaction chamber (i.e. recombinator 14) connected at said downstream side of said heater 13 (FIG. 1; Abstract).

Instant claims 1, 2, 5 and 10 structurally read on the apparatus of Nishino.

9. Claims 1, 5 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Goto et al. (JP 51-117193).

With respect to claims 1 and 10, Goto et al. (FIG. 2) disclose a device comprising:

- A heater 12;
- A feed line 4 for feeding a gas mixture having a hydrogen content to said heater 12;
- A blower 1 connected in said feed line 4 and having a delivery rate; and
- A control unit (i.e. comprising components 11, 13, 17, 18, 19, 20) associated with said blower 1 for adjusting the delivery rate of said blower 1 (i.e. indirectly via adjusting control valve 7) in dependence on the parameter characteristic for the hydrogen content of the gas mixture, wherein the parameter characteristic is a measured temperature value of the gas mixture flowing out of said heater 12 (i.e. signal from temperature sensor 18).

Although heater 12 schematically illustrated as a "coil" in FIG. 2, the Examiner takes Official

Notice that a heater "chamber" is well known in the art.

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With respect to claim 5, Goto et al. further disclose a reaction chamber 2 connected at said downstream side of said heater 12 (FIG. 2).

Instant claims 1, 5 and 10 structurally read on the apparatus of Goto et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 2, 5, 6, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrie (U.S. 3,907,981) in view of Nishino (JP 64-020498).

With respect to claims 1 and 10 (FIG. 1-6; column 2, line 52 to column 3, line 10; column 3, lines 32-36; column 4, lines 18-52), Henrie discloses a device comprising:

- A heating chamber 4;

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- A feed line (i.e. inlet conduit **10**) for feeding a gas mixture having a hydrogen content into said heating chamber **4**;
- A blower **8** connected in said feed line **10** and having a delivery rate; and
- A control unit **14, 16, 18, 19** associated with said heating chamber **4** for adjusting the temperature of the heater in response to a parameter characteristic (i.e. a measured temperature value of the gas mixture flowing out of said heating chamber **4**, determined by temperature controllers **14, 16**).

However, Henrie is silent as to whether the control unit **14, 16, 18, 19** may be associated with the blower **8**, for adjusting the delivery rate of said blower **8** in dependence on the parameter characteristic (i.e. the gas mixture temperature). In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to modify the control unit of Henrie, such that the control unit was associated with the blower, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such control schemes are conventionally known in the art, as evidenced by Nishino, and furthermore, the substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). In particular, Nishino (Abstract; FIG. 1) teaches a device, substantially similar to the device of Henrie, comprising a heater **13**; a feed line for feeding a gas mixture having a hydrogen content into said heater **13**; and a blower **7** connected in said feed line and having a delivery rate; wherein the device further comprises a control scheme having a control unit (i.e. comprising

computing elements 9, 10) associated with the blower 7 for adjusting the delivery rate of said blower 7 (i.e. indirectly via flow rate controller 3) in dependence on the temperature of the gas mixture flowing out of said heater 13 (i.e. via signals from temperature sensors 11, 12).

With respect to claim 2, Nishino further teaches the control scheme comprises a hydrogen sensor for determining the hydrogen content of the gas mixture, said control unit having an input side connected to said hydrogen sensor (i.e. "Computing elements 9, 10 automatically regulate the opening degree of the inlet flow rate... using the average value m% of the measured concn. value m1% of the hydrogen in the dry well obtd. by the atmosphere monitor... "; Abstract).

With respect to claim 5, Henrie discloses said heating chamber 4 has a downstream side, and a reaction chamber 6 is connected at said downstream side of said heating chamber 4 (FIG. 1; column 2, lines 52-68).

With respect to claim 6, Henrie discloses a static mixer 6 connected downstream of said heating chamber 4. The reaction chamber 6 of Henrie meets the claim of a "static mixer", since the reaction chamber functions "... to retain the gases therein for a time interval which is sufficient to allow the thermal recombination reaction and to mix previously reacted gases with the newly delivered gases from the heater 4; (column 2, lines 52-68; FIG. 1-6).

With respect to claim 7, no further structural limitations are recited, and therefore the apparatus of Henrie meets the claim, since "the gas mixture" is not considered an element of the apparatus. In any event, Henrie discloses the gas mixture has a flow path permitting said static mixer 6 to be heated by a partial stream of the gas mixture heated as a results of a recombination reaction (i.e. countercurrent flows as illustrated in FIG. 2, 4, 5, 6; also part stream flow via inlet conduits 62; column 3, line 58 to column 4, line 29; column 5, line 9 to column 6, line 15).

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11. Claims 3, 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrie (U.S. 3,907,981) in view of Nishino (JP 64-020498), as applied to claim 1 above, and further in view of Saalfrank (DE 33 39 242).

With respect to claims 3, 4 and 8, Henrie further disclose, "the heater 4 may be conventional" (column 2, lines 59-60), but are silent as to whether the heater 4 may comprise specifically a heating chamber having a number of heating elements, wherein each of said heating elements is disposed within a respective flow pipe, or whether the heater 4 may comprise an internally insulated housing in which said heating chamber is disposed. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select such a heater for the heater 4 in the modified apparatus of Henrie, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such a heater is conventionally known in the art, as evidenced by Saalfrank; and furthermore, the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). In particular, Saalfrank (FIG. 1, 2) teaches a heating vessel 1 for oxidizing hydrogen-containing air, comprising a plurality of straight heating rods 25 arranged parallel to one another (only one of which is illustrated), wherein the heating rods 25 are each surrounded by flow pipes 24, so as to achieve effective heat transfer by means of a narrow annular gap 30. The heating vessel 1 comprises an internally insulated housing (i.e. thermal isolation material 42) in which said heating chamber is disposed.

12. Claims 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henrie (U.S. 3,907,981) in view of Nishino (JP 64-020498) and Saalfrank (DE 33 39 242), as applied to

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claims 1 and 8 above, and further in view of Shimada et al. (U.S. 4,430,292) and Henrie (U.S. 3,755,075).

With respect to claim 9, Nishino further teaches that after heating, the gas may be cooled downstream by a "cooler" **15** and separated via steam separator **16** (FIG. 1, Abstract). However, the collective teachings of Henrie, Nishino and Saalfrank are silent as to specifically "a splash cooler" connected on said downstream side of said heating chamber, in the modified apparatus of Henrie. Shimada et al. teaches an apparatus for the recombination of hydrogen with oxygen gas, comprising a recombining unit **13** having a heater **12** disposed within, wherein a condenser or "splash cooler" **15** is connected to the downstream side of the recombining unit **13** for cooling the gases exiting the unit **13** (FIG. 1, 2; column 3, line 22 to column 4, line 53). It would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to provide a "splash cooler" connected to the downstream side of the heating chamber in the modified apparatus of Henrie, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since the provision of a cooling means would enable the generated water vapor from the recombination reaction to be condensed out and separated; and furthermore, a splash type cooler provides increased heat transfer efficiency between the cooling water and the gases in comparison with the use of a conventional shell and tube heat exchanger, as taught by Shimada et al. (column 4, lines 17-26).

Although the collective teachings of Henrie, Nishino, Saalfrank and Shimada et al. are silent as to whether the housing of the splash cooler may be directly connected to said internally insulated housing in which said heating chamber is disposed, in the modified apparatus of Henrie, it would have been an obvious design choice for one of ordinary skill in the art at the

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time the invention was made to modify the splash cooler in the modified apparatus of Henrie according to such a configuration, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since it has been held that making elements integral involves ordinary skill in the art. *Nerwin v. Erlichman* 168 USPQ 177 (PO BdPatApp 1969); *In re Wolfe* 116 USPQ 443 (CCPQ 1958); *In re Howard* 150 US 164 (USSC 1893), and furthermore, integral recombination and condenser devices are conventionally known in the art, as evidenced by Henrie '075 (see FIG. 3, which illustrates a condenser-type recombiner 108 comprising a direct spray condenser 112, 114; column 5, lines 36-65).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Nishino JP '095 is the related invention of Nishino JP '498, as recited above.
- Bhan '796 is the English equivalent of applicant's individual disclosure DE 2 300 499.
- Frumerman et al., Rogers, Sasaki, and Mori are provided to illustrate the state of the art.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung

May 4, 2003

JAL

Hien Tran
HIEN TRAN
PRIMARY EXAMINER